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Horticultural Society's Golden Jubilee....

By S. LLOYD FRISBIE
BUSINESS MANAGER
THE CITRUS INDUSTRY

Birthdays are not always such jubilant affairs as one nears the half century mark, but the fiftieth anniversary of the Florida State Horticultural Society held in Ocala on April 13th, 14 and 15th was the outstanding execption.

Outstanding from the standpoint of attendance, the meeting was packed with entertaining and instructive features from the very first session until the closing meeting.

Indeed, so far as we were able to observe, there was only one disappointing note in the entire program — and that was of the extra curricular variety. The widely advertised snake fight which was scheduled to take place at Silver Springs failed to materialize. There was no dearth of snakes. Some five hundred or more of them, rattlers, moccasins, and king snakes crawled and squirmed about the feet of their keeper, Roy Allen, but nary a fight was in a single one of them.

Otherwise the program was one of those affairs so perfect in its timing and performance as to give the impression of having been rehearsed repeatedly in order to attain its perfection, and such was certainly not the case.

But to one who admits considerably more knowledge of publications and such than of citrus it was clearly apparent that the interest of the big crowd which attended the Golden Jubilee meeting of the Florida State Horticultural Society was real and intelligent.

Also the writer gathered a very definite impression that in this meeting the primary purpose for which it was organized — that of disseminating information of particular interest to Florida growers — was being carried out impartially and with the completely unselfish purpose of giving to the members of the Society the most recent information available as to ways and means of growing the finest fruit possible and how to protect their trees from the various pests which might attack them.

In any gathering where fifteen hundred or two thousand people in the same line of endeavor are assembled it is not at all unusual to find politics buzzing around promiscuously and with malice aforethought, but if that bee made a single buzz at this genial get-together the author was out of hearing — and usually such a buzz is audible for a long distance.

This publication will publish from time to time many of the valuable papers which were presented at the meeting but to attempt to summarize them in this brief sketch would take entirely too much space.

Not only were the members of the Society giving evidence of their satisfaction with the meeting by their record-breaking attendance and their very acute interest, but the towns-folk joined in exerting every effort possible to co-operate with the Society. Of particular interest were the many window displays over the city where various phases of citrus production, handling and disease control were shown.

Particularly impressive were the repeated statements heard from numerous sources that the Horticultural Society as the result of the great interest shown in this meeting was now very definitely and actively recognized as a most important adjunct to the industry in the state. The founders of the Society of fifty years ago may feel that their original purpose has been conclusively recognized and that the long period of usefulness which their Society has served in the past will be further intensified in the future.

Dominating all of the entertainment features was the colorful pageant entitled "Golden Harvest" and staged out of doors along the shores of beautiful Silver Springs. The pageant was a romance of Florida citrus fruits written by Nina Oliver Dean.

It was undoubtedly the most impressive pageant of the sort ever presented at any similar gathering in Florida. Elaborately painted back drops, beautiful and accurately designed costumes, a carefully rehear-

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Windbreak For Prevention Of Damage To Citrus Trees

BY H. S. NEWINS
Professor of Forestry at The University of Florida

PRESENTED AT THE GOLDEN JUBILEE MEETING
OF THE FLORIDA STATE HORTICULTURAL SOCIETY

The use of wind breaks as a protection to citrus trees in Florida is a local subject of much interest and one which should require considerable research work in the accumulation of the necessary data to obtain the desired information as to the most adaptable species to be used and the effective distance of protection from desiccating and cold winds.

There have been many scientific contributions concerning the application of windbreaks in farming communities more or less, generally throughout the various regions concerned in the world, including Russia, Australia, Scandanavia and the United States. A list of some of these publications as cited by Daniel Denuyl of the Forestry Department of Purdue Agricultural Experiment Station in his article "The Zone of Effective Windbreak Influence" in The Journal Of Forestry, Volume XXXIV, No. 7, July, 1936, is appended to this paper. Bulletins and circulars have been published by the U. S. Forest Service and by the Experiment Stations of the Prairie Regions and farming states dating back to and before the original studies of C. G. Bates in 1911, but very few of these publications have applied specifically to citrus trees and indeed the only immediately available publication on this respect seems to be that of H. S. Reed and E. T. Bartholomew in 1930, "The effect of desiccating winds on citrus trees, University of California Agrficulture Experiment Station, Bulletin 484." The results of this experimental work in California indicate that "anemometer and production records show that the zone of complete protection extends from a distance five to six times the height of the windbreak." The claims made by the various other writers listed relative to the scope of protection from windbreaks as studied in different regions of the world for direct winds approaching at right angles to the windbreak, vary from a zone of a "narrow strip on the windward side" to 20 to 40 times the height of the windbreak on the leeward side! It is obvious that we are not much concerned with the percentage of wind reduction on the windward side where the velocity is momentarily reduced by the banking of the wind as a "cushion" against a tight windbreak. But we are concerned with the degree of effectiveness to the leeward. Many of the treatises listed above are at variance, one with the other, and in some cases by their own statements are at variance with themselves possibly because they seem not to reveal any scientific data to substantiate their own findings and they leave the impression that their observations are empirical only. We are now admitting in this paper the need for scientific data concerning windbreaks for the protection of citrus trees in Florida and until such experiments are made available we trust these remarks may stimulate further discussion.

Denuyl, in his experiment at Purdue, has painstakingly recorded the readings of wind velocities at definitely fixed stations to the leeward of windbreaks varying from non-penetrable to open in density and for wind velocities up to continuously high velocities of long duration. He shows also the results of a seven months study of the windward influence of a windbreak revealing no reductions in velocity beyond a point twice the height of the windbreak when the wind is blowing at right angles of the longitudinal axes of the windbreak. His studies in this regard indicate that much of the time the wind encounters the shelter at other angles when the reduction is neglibile to the windward side and in fact the wind then is partially deflected up over the shelter or filters through it. It is concluded from these studies that the effectiveness to the leeward side of the windbreak to be efficient should rate 50 per cent or more in wind reduction and by a review of these data it is evident that for winds of an average velocity cited from 5 to 30 miles per hour and for windbreaks of different densities (from 25 to 30 feet in height with a width of 25 to 50 feet, this effective zone of influence of the windbreak is restricted to six times the height of the shelter, or to illustrate perhaps more clearly, let us say for a windbreak 30 feet high the zone of effectiveness is a distance of 6 x 30, or 180 feet.

The reduction of wind velocity under discussion is beneficial to citrus trees because of the proportionate reduction in evaporation from the soils and trees themselves. In the immediate lee of effective windbreaks this decrease in evaporation has been as much as 65 percent.

Windbreaks affect the temperature of the protected site during winds by causing a raise in temperature during the day. Obviously, any decrease by night is but evident if there is a wind and since frosts only occur when there is practially no wind, the presence of the windbreak should be no factor in creating any frost hazard in this respect. In fact, the complete stagnation of the air should be beneficial where smudge pots are resorted to!

The species best adapted for windbreaks run the gamut from Mulberry, Osage Orange, Green Ash and Locust in the Middle West of the United States, to Monterey Cypress, Monterey Pine and Eucalypts in the California citrus orchards, but for the citrus groves of Florida these trees are not so adaptable as are others which are native here and those which have become better acclimated.

There are seven species of pine indigenous to this state which are collectively known as the Southern Yellow Pine. From the viewpoint of economy in timber production as subsequent thinnings would be made in our Florida windbreaks these species might be considered because of their dual value and because of the wide range of adaptability among these species to our soils but as the trees develop beyond the juvenile stage of growth the stem is no longer clothed with branches but the

boles are naturally pruned, and therefore a windbreak of such trees would require underplanting. This could be accomplished perhaps by the use of such species as the Biota (Thuja orientialis) where adaptable with the aid of similar shrubs. Of these plant species the loblolly Pine (Pinus taeda) and the sand pine (Pinus clausa) retain their branches more satisfactorily if used for this purpose.

Under the terms of the Clarke-McNary Act of 1924 planting stock for purpose of wind-breaks and reforestation can be obtained at a reasonable cost from the Florida Forest and Park Service. Orders for Slash pine (Pinus Caribaea) can be placed with the nearest District Forest Office. Other species are not so readily available but can be obtained from nursery dealers.

The native Juniper species both lucayana and virginiana because of their columnar form and dense juvenile crowns are suggested for close planting on appropriate sites as shelter-belts or wind-breaks. Also, the native Southern white cedar (Chamaecyparisthyoides) can be used somewhat but to a less degree because of the requirement of this tree for soil moisture.

Bamboo (Dendrocalamus, sp) is is not desirable because of the wide spreading root systems which rob the soil moisture from the protected site, for a considerable distance.

The Eucalytus (Cucalytus, sp.) already referred to as used in California is also adaptable in some locations in Florida and likewise with the Monterey Cypress (Cupressus macrocarpa.) However there are three species of Cupressus which are well adapted to the citrus areas of Florida, namely the Italian Cypress (C. sempervirens). the Arizona Cypress (C. Arizonica, var. bonita) and the Portuguese cypress (C. lusitanica). The last named reaching an ultimate height of fifty feet and with the lower branches nearly to the ground level is perhaps the most desirable of the genus for Florida planting.

Cherry Laurel (Laurocearsus caroliniana) is of value as a native evergreen and reaches a maximum height of about thirty-five feet on well drained, fertile soils. This tree may be headed back and used for underplanting.

Laurel Oak (Quercus laurifolia) and upland willow oaks (Q. cinera) have some value for windbreaks but will require other plantings as suggested for the pines.

The most adaptable tree for general purposes, however, as a windbreak for citrus in Florida from our observation is the Australian Pine or Beefwood (Casuarina, sp.). The most commonly used is that of equisetifolia. The species Cunninghamiana is more hardy though and therefor is better suited for plantings in the central part of the state. The species Lepidophloia has a much thicker "foliage" than the other species and therefore is especially desirable for windbreak purposes but this last named species has not been known to seed in Florida and is propogated by root suckers which sprout freely under the trees. Cutting a ditch between the windbreak and grove and filling up is desired and the cutting of another ditch every three or four years to sever the roots of windbreak trees aides in keeping the roots out of the grove. The Australian Pine is exotic but has already escaped from cultivation and is adaptable as far north in the State as citrus groves can be successfully developed. There is in fact a row of these trees bordering the Florida Field at the University of Florida. Other prominent plantings include those on the Gandy Causeway between Tampa and St. Petersburg.

Australian pine windbreaks have been used for the past fifteen years to protect citrus trees along the east coast, especially from Melbourne southward. These trees grow rapidly and can survive winds of hurricane strength because of their flexibility to bend under extreme pressure and return aater to normal posture.

Other trees which may be considered for windbreak purposes and especially in Southern Florida include the following:

Acacia (Acacia auriculiform is).
Blark Olive (Bucida buceras).
Pongam (Pongamia pinnata).
Lebbek (Albizzia Lebbek).
Silk-Oak (Grevillea robusta).
Tropical Almond (Terminalia Catappa).

Wind-breaks should of course be planted on the most exposed sides of citrus groves in order to afford protection from the prevailing winds. Some preparation should be given to the soil in order to well establish the species used in the shelter-belt. The spacing in rows will vary according to local conditions and the species used.

Publications as cited by Daniel Denuyl, of the Forestry Department of Purdue Agricultural Experiment Station, in his article "The Zone of Effective Windbreak Influence" in the Journal of Forestry, Vol. XXXIV, No. 7, July 1936.

1. Anderson, R. H. 1931, Tree planting on the farm. New South Wales Dept. Agric. Farmer's Bull. 167, p. 7.

2. Barth, Agnar, 1934. Om vindens produks jonsnedsettende innflytelse i skogen og midlene til i bekjempe den. (Effect of wind in causin decrease in forest yields and means of conteracting it). Grandahl & Sons Boktrykkeri: Oslo. (Translation by C. Mygind, Div. of Sil., U. S. Forest Service, 1934. Mimeo. p26)

3. Bates, C. G. 1911. Windbreaks: their influence and value U. S. Dept. Agric. Forest Service Bull. 86, page 45.

4. — — — — — 1934. The plains Shelterbelt project. Joun. of For. 32: 978-991.

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7. Gorshenin, N. M., Y. D. Panfilov, N. Y. Godunov, A. S. Barabanschkikov, and P. E. Kolomeitsev. 1936. (Forest and agricultural improvement in the irrigated trans-Volga region.) Exps. & investigs. All-Union Research Inst. for Silviculture and Forest and Farm Im-

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Observations On Psorosis Of Citrus Trees In Florida

BY DR. ARTHUR S. RHOADS,
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FLORIDA AGRICULTURAL EXPERIMENT STATION

AT MEETING OF FLORIDA STATE HORTICULTURAL SOCIETY

Psorosis is one of the gumming diseases of citrus trees, the cause of which is not definitely known. It is characterized by the development of a series of scaly, ulcerated lesions which soon girdle the attacked trunk or limbs, causing the death of the tree in the course of a few years. Psorosis is of considerable importance in many sections of Florida and frequently takes a heavy toll of bearing trees after they attain an age of from 10 to 12 years. In some groves from 10 to 20 per cent of the trees may be attacked, making it necessary to remove periodically a considerable number of trees that have declined to the point where they are no longer profitable. Although psorosis may be serious in certain groves, in others nearby on the same type of soil and under the same general conditions of management it may occur but infrequently or not at all. Some growers believe that the source of budwood is responsible for the widespread occurrence of this disease in certain plantings and for its absence in other adjacent plantings where the trees came from different nurseries. Psorosis appears to occur on all types of soil ranging from light, sandy soils to low, heavy ones.

In Florida, as in California and other citrus-producing countries, the sweet orange is probably the most susceptible species. The Valencia orange and the little planted Washington Navel orange appear to be the varieties most frequently attacked. Grapefruit is also attacked, but usually much less frequently than orange trees. A bark disease, similar to psorosis in some respects, but much less destructive, is of general and extensive occurrence on tangerine trees. The sour orange and rough lemon appear to be quite resistant to this disease.

Psorosis was first named and described briefly by Swingle and Webber (1) in Florida in 1896. The Greek word selected for the name means ulcer and is descriptive of the ulcerated appearance of the bark in advanced stages of the disease. This disease was reported from California by Smith and Butler (2) in 1908, under the name scaly bark, by which it still continues to be generally known in that State. In Florida, however, the latter name is reserved for an entirely different disease, known also as nail-head rust. Growers in the latter State frequently do not distinguish psorosis as a specific disease but consider it under the general name "gummosis," a general term applied to various citrus bark diseases accompanied by more or less gumming. Fawcett (3) has recently presented evidence that psorosis occurred commonly on old seedling orange trees in California as early as 1891. It is believed by some Florida growers that psorosis was introduced into Florida groves rebudded from budwood secured from California after the freezes of 1894-95. However, there is no question but what this disease was already established in Florida prior to these freezes. Psorosis is now known to occur in most of the citrus-growing countries of the world. Although first attracting attention in Florida and California, this disease was thought by Lee (4) in 1923 to have originated in the Orient and to have spread to some of the other citrus-growing countries with the spread of **Citrus** varieties and species.

Description of the Disease

Psorosis is a disease attacking the trunks, main limbs, branches, and occasionally even the twigs. It varies considerably in the mode and rapidity of its development, sometimes requiring a few years before it becomes serious, but, in other cases, frequently progressing with considerable rapidity. The first manifestation of the disease on the bark usually develops in one or more of three ways: (1) the eruption of the outer layer of bark into scales varying from fine to coarse; (2) small spots in which a little gum exudes or the bark becomes infiltrated with gum before the scaling begins; and (3) the formation of small pimply or pustular areas of bark which later become scurfy or finely scaly. In the latter form small pimply areas may appear simultaneously at several points on the limbs and even the small branches. The bark of these pimply areas becomes somewhat thickened and later becomes scurfy or finely scaly. These areas coalesce by enlargement so that occasionally a series of such lesions may involve extensive areas of the limbs and smaller branches, even occurring occasionally on twigs scarcely a quarter of an inch in diameter. Such cases of psorosis closely resemble a similar disease of apple trees known as measles, and this type of the disease has the appearance of being systemic.

In the early stages of the disease the inner layer of bark next to the cambium remains alive but a slight scraping will often reveal a yellowish-green color within the bark instead of the normal green color, with a brown discoloration at the base of the pustules in the outer bark. As the disease progresses, which often occurs slowly at first, the original pimply or scaly areas enlarge from year to year and the bark becomes somewhat thickened. The pimply or finely scaly type of psorosis is of much less frequent occurrence than the coarsely scaly type.

Up to a certain point in the development of psorosis the inner bark remains alive but a yellowish-green discoloration soon appears in the inner bark due to the development of gum in the region of the cambium layer between the bark and the wood. As a result of this internal gum formation the scale formation proceeds deeper in the bark. Later, small gum pockets frequently develop between the bark and the wood and in the vicinity of these areas the bark may die down to the wood and be sloughed off gradually by callous formation developing around the margins where the bark remains alive.

The psorosis lesions quickly encircle the attacked trunks and limbs and then elongate more or less rapidly from year to year. A zone of bark in advance of the ends of the lesions becomes cracked through internal gum formation and then begins to loosen and slough off. This may be accompanied by a slight exudation or infiltration of gum but this exudation is never as copious as in gummosis, usually being reduced to a few scattered drops at either end of the lesion, and often may be entirely lacking. Gumming and bark scaling is most active during the active growing season of the tree and appears to be much less active during the brief winter season.

With the progress of the disease new lesions develop from time to time at other points on the trunk, main limbs and branches. Trees have been observed where, in addition to the disease involving most of the trunk and lower main limbs, there were as many as 15 or more scaly, canker-like lesions scattered through the upper limbs of the tree. In all such cases where the disease develops more or less simultaneously at so many different points on the tree it appears to be systemic in nature. Only very rarely have trees been observed with lesions on the upper limbs when none had developed previously on the trunk or lower main limbs.

Psorosis lesions that have been developing for some time, particular-

(1). Swingle, Walter T., and Webber, Herbert J. The principal diseases of citrus fruits in Florida. U. S. Dept. Agr., Div. Veg. Phys. & Path. Bull. 8, 42 pp., 8 pl. (3 col.), 6 figs., 1896.

(2). Smith, Ralph E., and Butler, O. Gum disease of citrus trees in California. California Agr. Exp. Sta. Bull. 200; 235-270, 14 figs., 1908.

(3). Fawcett, Howard S. Citrus diseases and their control. Second Edition. xv—|—656 pp., 187 figs. (15 col.). McGraw-Hill Book Co., New York and London. 1936.

(4). Lee, W. Atherton, California scaly bark and bark rot of citrus trees in the Philippines. Philippine Agr. Rev. 16 (3): 219-225, pls. 19-26, 1923.

ly on the smaller limbs, frequently have a swollen or somewhat spindle-shaped appearance. This is due in part to the bark becoming thickened but also to the fact that the wood accretion is slightly stimulated, especially at the center of the lesion. In this advanced ulcerous stage the lesions are very conspicuous by reason of the pronounced breaking up of the outer bark into large flakes, scales, or even shaggy strips which curl away from the ends of the lesions in the process of sloughing off. Ulcerous, scaly bands are thus formed which may vary in length from a few inches on the smaller branches to from two to three feet or more on the larger branches, main limbs and trunks. In long-standing or well-advanced cases the disease frequently involves the entire trunk and lower main limbs, with numerous independent lesions scattered throughout the upper limbs in the top of the tree.

The gum canals formed between the bark and wood, so far as the bark is not killed, become overgrown by the formation of normal wood elements, thus being preserved in the wood of the attacked trunk or limb. A cross-section of an attacked trunk or limb in the intermediate stage of the disease may not show any discoloration except the dark brown lines of closely crowded gum canals in the outer layers of the wood. These lines of gum canals may be short, variously interrupted, or extend continuously around the trunk or limb and are usually repeated at intervals, alternating with normally developed wood accretion. The depth of these lines of gum canals indicates the length of time the disease has been active.

In advanced cases of psorosis the bark becomes invaded by various fungi, chiefly **Phomosis citri, Diplodia natalensis,** and **Fusarium solani** which frequently kill areas of bark considerably in advance of the margins of the lesions and greatly aggravate the severity of the trouble and the rate of decline of the trees. These organisms have been isolated repeatedly from the margins of psorosis lesions by the writer during the past few years, but apparently must be regarded as secondary in nature since they do not occur associated with the early stages of the disease. Shortly after areas of bark die they become invaded by flat-headed borers and gradually disintegrate. The wood of old lesions on trunks or main limbs usually develops numerous areas where the bark has been killed and sloughed off, interspersed with islands or patches where the disease has permitted the inner bark to remain alive sufficiently to regenerate itself and develop until the attacked trunk or limb becomes more or less completely girdled and dies. When the girdling becomes sufficiently severe to interfere with the normal life of the tree the worst affected limbs, or perhaps the entire tree, begins to exhibit various symptoms of distress, such as reduction in the size and number of leaves, yellowing of the foliage, dying back of the twigs and branches, and occasionly abnormally large, coarse fruit. Diseased limbs that have declined seriously are commonly cut off by growers, but invariably too late to retard the progress of the disease, which apparently has become systemic. The decline of the tree depends largely upon the number and distribution of the lesions. Often the limbs on one side die first and the remainder of the tree may continue to grow and produce well for a time but usually succumbs to the disease eventually. The disease appears to develop most rapidly in trees suffering from lack of water, inadequate fertilization, or other conditions which tend to deplete the vitality of the trees.

By the time the disease has progressed to the late intermediate or advanced stages and areas of bark have been killed down to the wood a pronounced discoloration develops in the interior of the trunks and larger branches. In cross or longitudinal sections of such trees the entire central portion invariably is found to be extensively discolored light brown and often with drab-gray areas or flecks in places, giving a somewhat mottled appearance. This central discolored area is demarked from the external, more or less sound wood by one or more highly irregular, dark brown zones which appear as sinuous lines in sectional preparations. These zones are occasioned by gum deposits which plug up the water-conducting vessels. In addition, a number of dark brown flecks often occur in the peripheral portions of the central discolored area. This central discoloration frequently involves almost all the wood of an attacked trunk or limb, sometimes encroaching within an eighth of an inch of the living bark or even extending out to the bark in areas where it may be gumming. Not only does this marked discoloration involve nearly all the cross section of attacked trunks or limbs, but it extends for considerable distances longitudinally, and often well in advance of the upper and lower limits of gumming or bark lesions. Furthermore, this pronounced discoloration of the wood may even extend below the bud union, involving more or less of the wood of the root crown, particularly in trees on rough lemon stock.

Numerous cultures made by taking blocks of this discolored wood with aseptic precautions have demonstrated that it frequently is extensively invaded by various fungi. Among those that have been isolated may be mentioned **Phomopsis citri, Diplodia natalensis, Coniothyrium,** and others not yet identified. There is no question but what these fungi, when they extensively invade the wood of the trunks and limbs, materially contribute to the decline of the trees.

When trunks or limbs with advanced stages of psorosis are cut up the extensively discolored wood frequently has a peculiar, unpleasant odor. With such profound changes wrought in the wood of the attacked trees it is quite obvious that such wood, extensively invaded by fungi and containing deposits of gum, naturally is unable to function properly in the life processes of the tree, so that trees with the wood in this deteriorated condition must of necessity decline gradually.

Nature and cause of psorosis

Numerous attempts have been made, both by Fawcett in California and the writer in Florida, to isolate the organism causing psorosis, but without success. Fawcett (5, 6, 3) has recently presented evidence which indicates that psorosis may be due to a virus rather than to an organism, and described for the first time a mosaic effect on the young, rapidly growing leaves, which is associated with the well-known bark smyptoms, but may also occur in their absence. This mosaic effect is often evanescent, occuring only in young, rapidly growing leaves of a certain age and disappearing as they mature. In addition, he has observed spots on older leaves, watersprouts, and rarely the fruit, which he regards as additional symptons of psorosis. In Florida, however, the writer has not observed any typical cases of the mosaic symptoms described by Fawcett on the foliage of trees affected by psorosis. He is of the opinion that considerably more work must be done on this disease before the virus hypothesis for its origin can be substantiated.

A virus has been considered to be an ultramicroscopic principle known by its effects but beyond the range of present-day microscopic vision. Recently, however, Stanley (7) has isolated from tobacco plants a crystalline protein having the properties of the tobacco-mosaic virus and capable of producing the mosaic when injected into healthy plants. Virus diseases are very common among various plants and as examples of well-known ones may be mentioned peach yellows—a disease which baffled scientific investigators for many years, potato streak, mosaics of sugar cane, tobacco, tomato and numerous other plants, and curly top of sugar beets. A virus may pass to all parts of a plant, in which case it is known to be systemic, or it may invade only certain parts or local regions of the plant, in which case it is said to be localized. Virus diseases are usually transmitted by means of sucking insects which serve as carriers or vectors through feeding on diseased plants and then on healthy ones.

It is of interest to note that Fawcett (6) succeeded in transmitting psorosis from diseased to healthy citrus trees by means of buds, bark grafts and root grafts, although several years elapsed before the bark symptons developed. The writer attempted to transmit this disease by means of patch grafts of diseased bark ¾ of an inch square, but with no apparent success after nearly two years.

Fawcett is of the opinion that

(Continued on Page 16)

(5). Fawcett, H. S. New information on psorosis or scaly bark of Citrus. California Citrograph 18 (12): 326. October, 1933.

(6). Fawcett, H. S. Is psorosis of Citrus a virus disease? Phytopathology 24 (6): 659-667, 3 figs., June, 1934.

(7). Stanley, W. M. Chemical studies on the virus of tobacco mosaic. VI. The isolation of a crystalline protein possessing the properties of tobacco-mosaic virus. Phytopathology 26 (4): 305-320, 1 fig., April 1936.

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ALL IN THE SAME BOAT

Here in Florida we are inclined to believe that citrus growers in other states do things better than our own growers. We are inclined to believe that Florida growers alone are guilty of shipping immature or off-grade fruit; we assume that Californians and Texans are guiltless of any such practice.

Those of us who have held to this belief, and who have condemned our growers for the practice, will do well to read the following from a writer in the Mission Times, published in the heart of the Texas grapefruit belt. This writer, a heavy grower himself, says in part:

"Every thinking grower recognizes that next season promises equally as large, or possibly larger crop than the past season. Moves must be made now to insure its absorption by the consuming public if we are to realize a profit. We are all aware of the fact that during the past season two things definitely contributed to ruinous prices. These were the marketing of most, if not all, of our No. 3 fruit and the lack of any control by the industry of the quantity of fruit shipped over any given period. With the pending marketing agreement available, both of these matters can be effectively controlled. As a result of this condition, we are establishing a reputation for producing third grade fruit rather than quality fruit, which during the past season we kept at home and sent to the juice plants. This militates against profitable price levels. Let's adopt this pending marketing agreement, give it a fair trial and then we can more accurately appraise its value to the citrus industry. If it proves beneficial, we can continue it, if not, we can discard it."

Only a short time ago the California Citrograph, leading California citrus publication, warned California growers against the practice of shipping off-grade fruit.

Thus it will be seen that Florida growers are not alone in the practice. It appears to be universal wherever citrus fruits are grown. But this is no excuse for Florida growers to continue the practice. Indeed, it is all the more reason why growers in Florida should ship **nothing but the very highest grade of fruit, and** by so doing establish a reputation for quality while competitors are still indulging a practice which has been all too common here.

CITRUS CONTROL NEEDED

By a well-nigh unanimous action, the Florida legislature has approved an extension of the citrus control legislation which has been in operation for the past two years, passing bills which renewed the life of the control commission and adding features which broaden the powers of the commission and raise maturity standards.

Previous legislation, under which the control commission has operated, was not perfect. The present legislation does much to rectify any former imperfections and has the support of by far the greater part of the industry in the state.

The control commission has been of inestimable value to the industry in regulating shipments and systematizing the handling of Florida's record-breaking crop of the season just closing. The citrus growers of the state are to be congratulated and the legislators are to be commended for continuing the set-up under which the industry has been able to market the largest crop ever produced at a reasonable profit to the growers.

THE "RECOVERY ACT"

Whatever others may think of the so-called "Florida Recovery Act" it is evident that the proposition does not appeal to the citrus growers of the state.

Meetings of growers and marketing agencies vitally interested in the welfare of the citrus industry have voiced the industry's condemnation of the act in no uncertain terms.

With the memory of the very successful campaign of the grocery chains in promoting the sale of the enormous grapefruit crop of the season just closing, growers are in no mood to see the chains banished from the state and one of the largest potential markets for Florida citrus fruits closed to Florida products.

GOLDEN JUBILEE

The celebration of the Golden Jubilee of the Florida State Horticultural Society recently held at Ocala, the city in which the Society was organized fifty years ago, was a notable event in the history of the citrus industry and other horticultural interests of the state.

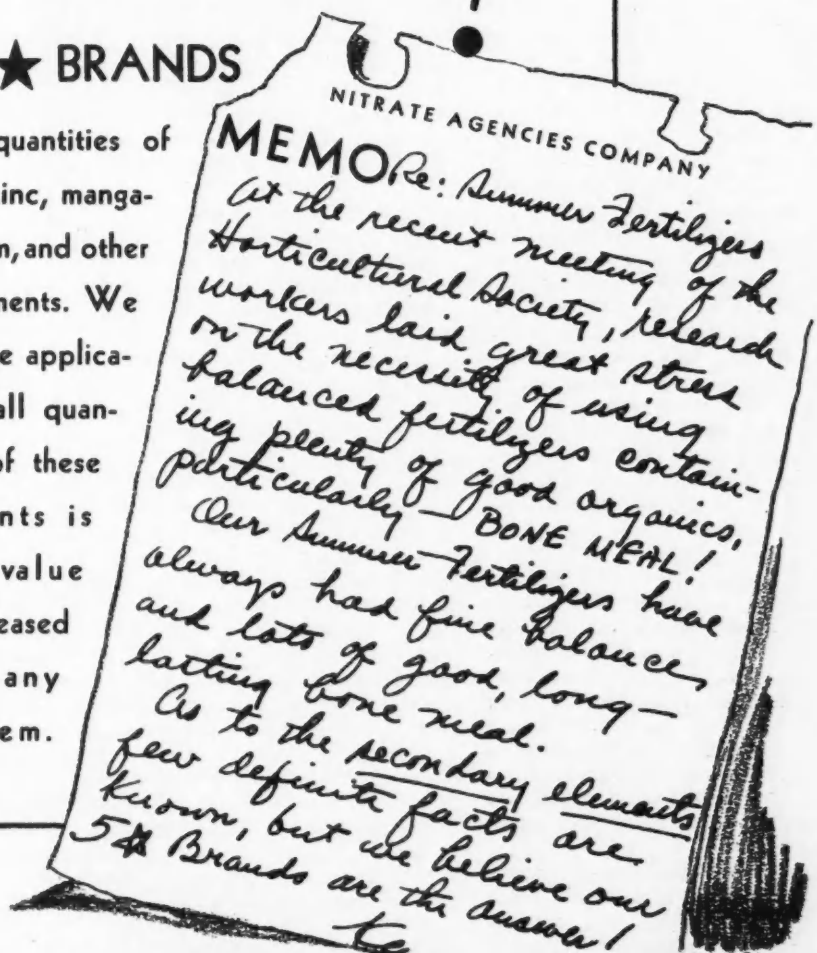
The attendance, by far the greatest in any recent year, if not in the entire life of the Society, testifies to the continued interest of growers in the activities and accomplishments of the Society in the past and their faith that it will continue to serve the industry in the future.

The successful grower knows every acre of his grove and every tree in every acre — and studies to know the need of every tree.

Compare Results!

NACO 5 ★ BRANDS

contain small quantities of iron, copper, zinc, manganese, magnesium, and other secondary elements. We believe that the application of a small quantity of many of these rarer elements is of greater value than an increased quantity of any one of them.


NITRATE AGENCIES COMPANY
MEMO Re: Summer Fertilizers
At the recent meeting of the Horticultural Society, research workers laid great stress on the necessity of using balanced fertilizers containing plenty of good organics, particularly BONE MEAL!
Our Summer Fertilizers have always had fine balance and lots of good, long-lasting bone meal.
As to the secondary elements few definite facts are known, but we believe our 5★ Brands are the answer!
Ken

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NACO BRAND

Practical Spraying And Dusting ....Of Citrus

BY FRANK L. HOLLAND

AN ADDRESS DELIVERED BEFORE THE GOLDEN JUBILEE MEETING OF FLORIDA STATE HORTICULTURAL SOCIETY

A grove is a factory in which we manufacture fruit goods to sell. Consumers of fruit, in their preferences, create market demand for various grades of our product. Their ideas along this line may not be the same as those of growers — but since the buyer preference sets the standards it seems the job of the grower to produce what the buyer is willing to pay the most money for.

Many factors constitute the reasons why consumers pay more money for certain grades of fruit. "Appearance" of fruit is one of the most important.

Appearance in turn is effected by a good many factors — some of which do not come under insect pest and disease control. However, a great many factors that effect the appearance of fruit, and consequently its grade and sale price, are associated with insect pests or diseases. Thence it would seem logical that we are informed as to how pests and diseases effect appearance and price of fruit; and in spraying and dusting, to control same.

If such a program is to be "practical" it must be necessary, safe, simple in execution, adaptable to growers' conditions, and must, above all, be based on sound economic facts. In other words, the grower must have a profit from his work along this line if it is justified.

Let us think of reasons for this as falling in two classes: namely, those that effect fruit that is picked, and those that effect the grower otherwise.

Taking the latter reason first, we think of, and have heard much general discussion of decreased pruning costs, regularity of production, decreased dropping of fruit, etc. Getting definite figures on these items in actual dollars and cents, I find quite difficult. We all know that, for instance, heavy scale infestation certainly causes loss of foliage; dead wood, with resulting pruning costs and production losses; heavy fruit dropping, etc., but this phase of practical spraying and dusting apparently has not been analyzed in terms of money. It seems to be one of those things that are so well recognized from experience that no agency has developed any figures that will show accurately the benefits, in dollars and cents, of a spray and dust program in connection with these items.

It seems rather vital however that figures pertaining to this phase of spraying and dusting be accumulated along at least three lines. (1) How much money can a grower afford to spend on this phase of the program, (2) What are average losses from neglect of this phase of the program, (3) Reducing to a real science, the advisability of making a treatment, and therefore removing such decisions from the realm of a loosely practiced art and considerable guess work.

From replies from a number of letters I wrote recently to various gentlemen in the State who are recognized leaders in research, Extension Work, or industry, along this line, I can probably say only that they emphasized scale control as the keynote to any program, and that scale, scab and melanose were very costly to tree condition and loss of fruit from dropping. Most of them emphasized importance of scale control. However, there is a great deal of information relative to spray and dust programs along the above mentioned general line which will be referred to later, in connection with that phase of the program relating to fruit.

Most of the figures available relative to spraying and dusting deal with differences in value of different grades of fruit, or incomes from groves; and, in recent years there has been some information developed on exactly what causes certain fruit to be graded down in a lower value class.

Concerning figures as to groves following various practices, or spending various sums of money on pest and disease control; Mr. R. H. Howard of the Extension Service has compiled some interesting figures relative to "Relationship of amount of money spent for spray and dust materials to returns from groves." For the year 1933-34 those groves spending from 34c to $2.99 per acre on dusting and spraying material had a total cost of $29.60, a total returns per acre of $36.82 and a net return for interest and supervision of $7.22. This group had a total cost per box of 44c, average returns per box of 54c and net returns per box of 10c. The average cost of spray and dust material in this group was $1.87 per acre.

In the second group who spent from $3.00 to $14.07 per acre for spray and dust material, with an average of $5.92, they had a total per acre cost of $68.00, total returns of $104 and net returns of $36.40, compared with the net returns of $7.22 in the first group. Mr. Howard points out, however, that yield was probably the most important factor and that increased yield in the profit making group was not only due to larger and wiser spending for pest and disease control, but also due to other factors, such as greater quantities of plant food, more irrigation and better grove care generally. In other words, the more profitable grower spent more money on several lines but he spent it wisely and at considerable profit to himself. It is hoped that more detailed figures, over a period of years, may be compiled.

Now for some figures on difference in value between fruit of different grades as a reason for spray and dust. From the weekly statistics of the Florida Citrus Control Committee, under date of March 31st, we find the following. In oranges last season regular No. 2 were worth 33c less than No. 1. Indian River No. 2 were worth 43c less than 1 and all No. 2 averaged 36c less than 1. This season the figures are 18c, 32c and 24c respectively. Average for both years .255, .375, .30. In reference to this current season's figures, however, it might be well to remember that fruit has been very closely graded due to

large crop, (according to opinion of many people to whom we have gone with questions concerning this), and it would seem that, due to this fact, figures mean much more than is indicated on the face of them.

Figures from the same source show that last season No. 2 grapefruit were 34c under 1, No. 2 Marsh were 44c under 1, Indian River Duncans were 49c under 1 and Indian River Marsh were 68c under 1; an average for Duncan and Marsh for last year of 49c less for No. 2 than for No. 1. This year the same figures are 18c, 19c, 29c, 39c and 26c.

With an average for the two years of grapefruit as follows. Regular Duncan No. 2 averaged 26c under 1, Marsh No. 2, 31½c under 1. Indian Riven Duncan No. 2, 39c under 1; Indian River Marsh No. 2, 53½c under No. 1; and taking Duncan and Marsh together the two years showed that No. 2 were 37½c lower in value than No. 1.

If you will adjust these figures to the State's crop you can see how enormous the loss is from producing off-grade fruit; or stated another way, the tremendous potential profit at hand if the fruit can be raised in grade.

But, you will say probably, most of this fruit was in a lower grade for some other reason than insect pests and diseases. Alright, let's analyze brifly some of the factors that cause fruits to be in a lower grade.

In this connection Bowman made a study of relative importance of grade lowering factors of citrus which brings out some interesting points. This study covered 119 groves, was made in Orange County packing houses and the work covered the 1934-35 season. This naturally limits its being applicable to fruit produced in any other season, or as an average. However, it seems to be well worth while as a guide. Factors he showed included those of shape, texture, off-color, mechanical scratches, etc., as well as those factors due to insect pest and disease. Bowman's figures show that 52.72% of grade lowering factors in the case of No. 2 oranges were controllable by spray and dust. Taking all varieties as an average it was less than this in some cases and considerably higher in other cases. In the case of No. 2 seedlings, factors controllable by spraying and dusting were approximately 60%.

In the case of grapefruit 67.43% of the grade lowering factors in No. 2 were controllable by spraying and dusting and 76.80% in the case of No. 3 grapefruit were controllable. That simply means that from 52% to 76% of the figures cited herein, showing difference in values between 2s and 1s this year and last, might be saved by the grower. In fact the percentage would probably run larger than that due to the fact that in Orange County during the year in which the crop was produced which Bowman studied, the Extension Service, in cooperation with packing houses and others, had a highly successful rust mite control campaign.

Getting down to brass tacks, it means that growers might have saved approximately 60% of the 30c loss in oranges for the past two seasons, which on the approximately 13,500,000 oranges shipped already this year means $2,250,000. His figures show that a little better than 70% of the average loss of 37½c on grapefruit during the past two seasons could have been prevented. On the 7,000,000 boxes of grapefruit shipped this year as fresh fruit, it amounts to $1,750,000. This means that approximately $4,000,000 has been lost this season due to our failure to control those grade lowering factors which are chargeable to insect pest and disease. If a saving of $4,000,000 or a substantial part of it, doesn't make a program practical, then I don't know what the word practical means.

Growers want to know **what, when** and **how much** to apply. They should of course know **how** to apply it also, but the principal question in their minds is "what, when and how much?" For many reasons a program that they term practical must be safe, simple in execution and adaptable to their conditions.

What, when and how much must be predicated on what we are trying to control. Bowman's figures show that melanose, scab, scale and rust mite are the most damaging diseases and pests, with melanose leading the field in importance varying from 24% in No. 2 early oranges up to 61% in No. 3 seedling oranges and 40.68 percent in the case of No. 2 grapefruit. These figures plainly emphasize the great loss accruing from failure to apply fungicides either in sufficient quantity or thoroughness.

Up until recent years **full strength** Bordeaux was the standard fungicide. Due to lack of information at that time concerning scalecides and other insecticides, many growers simply wouldn't use Bordeaux because of their dread of heavy scale damage following such applications. The history of this point in the last few seasons in Florida is almost like fiction.

First, the pathologists found that half strength Bordeaux was satisfactory as a post bloom spray for controlling melanose. This cut scale worry in half.

Then some newer types of copper came in that left less residue on leaves and reduced scale worry still more in many cases.

Then entomologists found that we could add wettable types of sulphurs to copper sprays and that by doing so we could not only get away from the scale scare but actually decrease scale population in most instances while we were controlling melanose, our most serious and costly enemy of fruit quality and value. Then later the entomologists proved additional advantages and possibilities in connection with using wettable types of sulphurs in with copper. So instead of the early spring spray being in ill repute, it is now probably the most widely used spray applied and this development of combination sprays for spring use is the most outstanding advance in making a spray and dust program practical, from the growers' point of view.

Yothers reported on such combinations before the Society in the spring of 1935 and Yothers and Miller, Kuntz and Ruehle and Thompson and others have reported on such combinations both in connection with fungus control and disease control a number of times. An article by Thompson in the March issue of The Citrus Industry magazine is called to your attention as valuable, practical information on this very important phase of spraying.

The subject of spray combinations will be presented here by Mr. Yothers, and other speakers are to discuss scale and rust mites, so no discussion will be attempted at this time.

Better Fruit Program Is Grower's Handbook

The Better Fruit Program, as issued by the Florida Citrus Commission, is really a grower's handbook on **what, when and how much** to apply. This practical program for spraying and dusting is a result of pooling knowledge, experience and effort on the part of research workers, Extension workers, manufacturers, growers and consultants.

Each schedule is complete within itself. However it should be noted that for general use of the first schedules, the making of certain applications assumes the making of cer-

tain other applications in the schedule. This is a most important point. In other words the schedules are **balanced** for the full year, and will give protection as well as correction. If a schedule is not followed thoroughly the grower loses protection and obtains only correction, thereby loosing most of the value.

The scientists dovetailed information from all sources relative to times of the year when certain diseases and insect pests are most damaging or present in largest numbers, or in the most susceptible stages. Starting with this as a basis, and having some newly manufactured products, or combinations of same, to work with (as well as old ones), a real, practical spray and dust program for Florida citrus was worked out. It's ready wide acceptance is proof of its need, merit and practicability.

Certainly this program will be improved.

Many types of coppers are now being investigated. The question of the fineness of sulphurs is being investigated along with other sulphur studies. Oil manufacturers are continually working to make their products more efficient. Real progress has been made in the past few years and there is every evidence of additional progress in the early future.

In connection with any practical spray and dust program, and with particular reference to the Better Fruit Program the question of "when" to make applications needs more work for exactness than does any other. This need is recognized and stated by the Advisory Committee (which assisted in developing the Better Fruit Program) in the last paragraph on the folder.

Such questions as: What effect temperatures have on occurrence or severity of any particular pest or disease? Will **this** particular year be light or bad for any one; will it be apt to appear earlier or later than average? What is the relation of humidity to pest and disease occurrance and severity? We certainly need more information along these lines and very definitely do we need more data on disease or pest damage to trees in dollars and cents. I refer particularly to the damage that can be expected to accrue under certain weather conditions, or to follow a given infection or infestation of any disease or pest at any particular time of year. Quoting from personal communication from Mr. Paul Dowling: "We need to take decision, as to the advisabiltiy of treating, out of the realm of a loosely practiced art and into the realm of exact science."

Such studies will probably require years of work and seem to be a prerequisite to a highly accurate and practical spray and dust program for control of pests and diseases.

Along this line Yothers and Miller reported on making determinations for **when** to apply rust mite control before the Society in 1934. This is just one example of the type of information we need, but we not only need to know **when** to apply, but **under what conditions we are apt to have trouble;** how much that trouble will cost us, and what expense we can afford to go to to combat it.

How to apply is just as important as other factors in any practical program.

Entomologists and pathologists have for years emphasized thoroughness of applying sprays and dusts and the use of proper quantities. Demonstrations of how to apply various types of sprays, and results of applying with different types of equipment, were made before different conference groups at the Citrus Experiment Station several months ago, in connection with general discussion of the Better Fruit Program. I understand that additional research and educational work is in progress or planned along this line.

The change in types of sprays used in the last two years focus thought on need for work along this line, coupled with needed work on equipment for applying. Some of the spray mixtures now used are quite dense and in some cases old agitator equipment would not keep the materials and mixture as a whole in good condition, with the result that the spray put out was quite thin and a great deal of settling took place in the tank. This has been taken care of in all new equipment, so far as I know, but undoubtedly there are too many old spray machines in use that, from the standpoint of agitation and pressure, need rebuilding or modernization. It should be apparent at once when thinking of some mixtures in which from 13 to 17 pounds of insoluble materials are used per 100 gallons, that the spray mix is much denser than in mixtures formerly used, and equipment throughout must be able to handle such mixtures if their use is to be efficient.

In the January issue of The Citrus Industry you will find, or possibly have read, a very valuable article on "The Art of Spraying Citrus Trees" by Mr. Hunt of California. It is felt that there is much work needed along this line as applying to citrus in Florida and when you think of the fact that a great deal of our spraying equipment, particularly guns, was designed originally for use on apples and peaches it may not necessarily be the very best for use on citrus, thinking of the difference in weight, size and density of foliage of citrus trees compared with apples and peaches.

Identification of Pests and Diseases Important At Times

Years ago it was highly important that each grower be thoroughly conversant with various pests and diseases. Then, each application was of one single material, applied for one single purpose, generally, and too frequently as a post-mortem corrective rather than a preventive.

With new information, materials, contributions and programs, the thing has changed. If a definite program is carried out the probability of an outbreak is much less, and accordingly the matter of identification is probably less important.

However it is, and always will be, important that we know enough about major diseases and pests to know where to look for them, at what time of the year, and what they look like.

Entomologists and pathologists Extension workers, and commercial men, have rendered much valuable service to growers in this specialized field of practical education. There seems to be need for yet more.

The advisory committee is now working on a plan to publish full natural color illustrations of pests, diseases and possibly other factors that cause fruit to grade down.

If and when this becomes a fact, there would seem to be little excuse for a severe or expensive condition to develop in any grove.

Airplane application is the newest idea in application of some materials and apparently offers great possibilities.

In closing I wish to emphasize that the Better Fruit Program seems to be a thoroughly practical spray and dust program for Florida to date. It is not perfect, but it is the best available today, based on present information. With research work now going on along many lines, and with progress in manufacture and continuation of unselfish, united effort, it will undoubtedly be improved in future years. Timing of application,

(Continued on page 22)

WINDBREAKS FOR PREVENTION OF DAMAGE TO CITRUS TREES

(Continued from Page 7)

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FARM PRICE INDEX FOR MARCH IS HIGHEST FOR MONTH IN SEVEN YEARS

The farm price index for March was the highest it has been for that month in seven years, according to a report from the Bureau of Agricultural Economics to the State Agricultural Extension Service.

The index on March 15 was 128, as compared with 127 on February 15 and with 104 on March 15, 1936. The highest post-depression peak was 131 on January, 15, 1937.

Sharp increases in prices received by farmers for cotton, cottonseed, cattle, sheep, lambs and fruit and moderate upturns in prices of corn, sweet potatoes, butterfat, and chickens were reported by the Bureau for the month ending March 15. Prices of small feed grains, tobacco, veal calves and eggs declined during the month.

All of the March 15 group indexes of prices received by farmers were higher than a year ago, the Bureau pointed out.

FLEW

St. Peter: "How did you get up here?"

Latest Arrival: "Flu."

Looking Over The Past Eighteen Months

JUST a year and a half ago the Florida Citrus Commission faced one of the first of its difficult problems—that of selecting an advertising agency to handle the advertising campaign promoting the sale of Florida oranges, grapefruit and tangerines. After meeting with, and carefully considering, a large number of agencies, the Commission chose Ruthrauff & Ryan, Inc. The Commission felt that the plan submitted by this agency was the most effective and most adaptable to the problem.

We are now nearing the end of our second season in advertising, and most of those vitally interested in this industry agree that the results have been more than satisfactory. Faced with the many unforeseen problems that accompany the marketing of a great crop, the advertising has borne its share in maintaining good prices—in broadening markets — and, above all, in increasing the demand for Florida fruit among consumers in nothern markets. That is where our real problem lies — in northern markets, where the bulk of this great crop must be marketed. And there is where advertising funds have been spent — in those markets where, dollar for dollar, greater returns can be realized through advertising.

Below are a few of the more important reasons why Ruthrauff & Ryan, Inc., has been able to be of utmost service to the industry:

1. **Personnel.** Ruthrauff & Ryan, Inc., has the great advantage of a large personnel. Any single department — copy, research, marketing, radio or planning — is in itself larger than any small advertising agency. Ruthrauff & Ryan, Inc., has more than 400 employees, and, because of its large volume of business, is able to employ experts in every department.

2. **Organization.** Ruthrauff & Ryan, Inc., has branches located all over this country and, therefore, is able to keep in constant close touch with the markets where Florida fruit is advertised and is able to cooperate closely, at a moment's notice, with the merchandising staff employed by Florida and now operating in northern markets.

3. **Experience.** Established nearly 30 years ago, Ruthrauff & Ryan, Inc., has for many years — and is now — handling many of the leading advertising accounts in this country. They have had thorough experience in marketing food products, and have consistently built sales against the strongest competition. They are thoroughly familiar with and have carefully tested every form of advertising.

4. **Accounts now handled include:**

Florida Citrus Commission
Dodge Brothers, motor cars and trucks
Lever Brothers, Rinso, Lifebuoy and Spry
R. B. Davis Company, Cocomalt and Davis Baking Powder
Gillette Safety Razor Company
B. F. Goodrich Company, tires and batteries
Campbell Soup Company, Franco-American Spaghetti
Bauer & Black, surgical products
Holland Furnace Company
Ironized Yeast Company
Lea & Perrins, Inc.
Noxema Chemical Company
and many others.

While tremendous progress has been made, Florida citrus still faces a hard battle ahead — a battle against other fruits and juices — a battle to increase consumption, especially of grapefruit and tangerines — a battle to gain complete recognition for Florida oranges against far larger competitive advertising appropriations. It is obvious that the experience gained on this account during the last year and a half is an invaluable asset to the Florida citrus industry — one of the many factors that will help us to do our part in making this great effort more and more effective.

RUTHRAUFF & RYAN, Inc.
ADVERTISING
LAKELAND, FLORIDA

New York . St. Louis . Detroit . Hollywood . San Francisco . Seattle . Chicago

OBSERVATIONS ON PSOROSIS OF CITRUS TREES IN FLORIDA

(Continued from Page 9)

psorosis may occur either in a localized form, that is, on the outer bark in restricted areas only, or in systemic form, that is, throughout the conducting system of the tree or one of its parts, either with or without the bark symptoms. He believes that the infection and development takes place in two ways: (1) starting as systemic from infected buds or grafts and later, as the tree becomes older, breaking through from the inside to produce bark lesions; (2) starting as a localized area on the outer bark and later, possibly after several years, breaking through to the conducting tissues and becoming systemic.

Psorosis is regarded by many as an infectious disease and in some of the newer citrus-growing countries trees exhibiting this disease are destroyed as an eradication measure. Growers in Florida frequently raise various questions involving the nature and development of psorosis and its mode of spread but we lack definite information concerning these points. The greatest drawback to obtaining such information has been the lack of definite observations, conducted over a period of years in the same groves. In order to throw some light on this phase of the problem the writer, with the assistance of Messrs. F. M. O'Byrne and E. F. De Busk, made a survey of a block of grove at Lake Wales, where psorosis occured extensively, on July 28, 1927, with a view to rechecking the trees at intervals. This block consisted of six rows of Valencia oranges, excepting two early orange trees, one Navel orange, and two each half Navel and Valencia orange, and one row of grapefruit trees, each row containing 51 trees. The trees were between 13 and 14 years of age in 1927 and are on rough lemon stock. The grove was well-cared for but no attempt was made by the manager to treat the trees on which psorosis had developed. However, at the times of the survey in 1927 the writer hastily scraped the bark lesions appearing on two grapefruit trees and one orange tree in the northwest corner of the block. The diseased trees received no further treatment during the succeding years. On November 17. 1936, the writer, together with Mr. F. M. O'Byrne, rechecked the trees. The chart shown in Figure 1 depicts the distribution and severity of psorosis in this block of trees, both at the time of the original survey in 1927 and at the time of the second one in 1936, and affords the opportunity of determining the progress of the disease during the nine-year period between the two surveys.

	First survey of July 28, 1927							Second survey of November 17, 1936						
Tree No.	Grape-fruit	Valencia orange						Grape-fruit	Valencia orange					
Row No.	7	6	5	4	3	2	1	7	6	5	4	3	2	1
51	M	0	M	0	0	0	0	VB	0	M	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	B	0	0	0	0	0	0	X5	0	0	0	0	0
48	S	S	0	0	0	0	0	0	0	S	0	0	0	0
47	0	0	0	0	VS	0	0	0	0	0	0	0	0	0
46	0	B	0	VS	0	0	0	0	X5	0	0	0	0	0
45	0	B	0	0	0	0	0	0	X	0	M	S	0	0
44	0	S	S	0	0	0	0	0	M	0	0	0	0	0
43	0	0	0	S	S	M	0	0	0	0	X	VS	X	0
42	B	0	0	0	0	0	0	X9	0	0	0	0	0	0
41	0	0	0	0	M	0	0	0	0	0	0	X	0	0
40	0	M	0	0	0	0	S	0	M	0	0	0	0	M
39	0	M	0	VB	0	0	0	0	M	0	X9	0	0	0
38	0	M	B	0	0	0	0	0	VB	X	0	0	0	0
37	0	0	0	0	0	B	0	0	0	0	0	VS	X	0
36	B	0	0	0	0	0	B	X9	0	0	0	0	0	X9
35	0	0	0	0	0	0	0	0	0	0	0	0	M	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	M	M	0	0	0	0	0	M	X5	0	0	B	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	M	0	0	0	0	0	0	X	0	0	0	0
30	B	0	0	0	VS	0	0	X	0	0	0	0	0	0
29	0	M	0	0	0	0	0	0	B	0	0	0	VS	0
28	0	0	M	S	0	0	M	0	0	X5	0	0	0	M
27	S	0	0	0	0	0	0	0	0	0	0	0	0	
26	0	0	0	0	0	0	0	0	0	0	0	0	0	X
25	0	VB	0	0	0	0	0	0	X9	0	0	0	VS	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	S	0	0	0	S	0	0	B	0
22	B	0	B	0	0	0	0	VB	0	VB	0	0	0	0
21	0	0	0	0	0	S	B	0	0	0	0	0	VB	X9
20	0	0	0	0	0	0	B	0	S	0	0	0	0	X9
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	B	0	0	0	0	0	0	X9	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	S	0	M	0	0	0	0	0	0	B	0	0	0	0
14	0	0	0	M	0	0	0	0	B	0	B	0	0	0
13	0	B	S	0	0	0	M	0	X	M	0	0	0	VB
12	0	0	0	0	0	S	M	0	M	0	X*	00	0	B
11	0	0	0	0	0	0	S	0	0	0	0	0	0	X
10	0	0	0	0	VS	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	B	S	0	M	0	0	0	X9	VS
8	0	0	0	0	0	0	B	0	M	0	0	0	0	X9
7	0	0	0	0	0	0	M	M	0	0	0	0	0	X
6	0	0	VB	0	0	0	0	0	0	X	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	M	0	0	0	0	0	0	X5	0	0	0
3	0	S	0	0	0	M	0	0	0	0	0	0	X5	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	S	0	S	0	0	0	VB	0	VS?	M	0	0	X5	**X9

*root rot ** cause unknown

FIG. 1.—Comparison between Psorosis surveys of block of grove at Lake Wales, Florida, in 1927 and 1936. LEGEND: O denotes trees not exhibiting psorosis; VB, B, M, S, and VS denote trees showing very bad, bad, moderate, slight and very slight cases of psorosis, respectively; X5 and X9 denote trees removed respectively 5 and 9 years ago on account of decline from psorosis and replanted; and X denotes trees removed in 1936 on account of decline from psorosis, but not replanted.

A more concrete idea of the rate of progress made by psorosis during the nine-year period between the two surveys, and of the rate of decline of the trees attacked by it, is afforded by the tabulated analysis of the block of 306 orange trees given in Table. 1.

From this table it is apparent that of the four trees listed as very bad in 1927, three were removed the following year and the other one in 1936. Of the 14 trees listed as bad in 1927, all but one, which is now very bad. have also been removed. Most of the cases of the disease listed as moderate in 1927 became worse, although in five trees the disease apparently made no particular headway. Of the 15 trees listed as slight in 1927, five now show no evidence of the disease, two very slight evidence, and the balance have become worse, with two being removed. In the four trees listed as very slight in 1927 no evidence of psorosis is now apparent. It is possible that in some of the cases where the disease was listed as either slight or very slight a small area where the bark had begun to scale was assumed to be the beginning of psorosis, but this possibility certainly can not be used to discount all the apparent cases of recovery noted. On the other hand, among the 250 trees listed as showing no evidence of psorosis in 1927, at the end of 1936 two were found to have developed bad cases, five moderate cases, four slight cases, and three apparently very slight cases. Thus the disease appears to have disappeared on nine trees where it was noted in 1927, and to have made its appearance on 14 additional trees during the nine-year period involved. This is a very low rate of increase.

Similar progress of the disease was also noted among the single row of grapefruit trees included in the survey. Of four grapefruit trees listed as bad in 1927, two were removed the following year and one in 1936; the other tree is now very bad. One tree listed as moderately bad in 1927 was found to be very bad in 1936. Five trees listed as slight in 1927 showed no evidence of the disease in 1936. On the other hand, one tree not showing psorosis in 1927 was found to have a moderately bad case in 1936.

Within this block, as in the case of other groves in which psorosis surveys have been made, there does not appear to be any tendency for the disease to be localized at any particular point or points which might be construed as centers for the spread of the trouble, but shows that the disease is distributed sporadically throughout the entire block. A study of the location of the 15 new trees developing psorosis during the nine-year period that elapsed since the first survey of 1927 shows that only a few adjoined trees having psorosis, most of them occurring at points remote from the original di-

seased trees. In no instance was any evidence of psorosis observed on any of the trees set out to replace those that had declined from this trouble, and several of these had been growing for nine years.

Control of the Disease

Prevention — It is held by Fawcett (3) that much of the psorosis originates in the budding material used in propagation, since his experiments have proved that the disease can be transmitted in that way. He believes it possible that this disease may even be transmitted in a small percentage of seeds from diseased trees. In event it be definitely proved that psorosis is a virus disease a careful inspection of "parent" trees should be made to determine that they are free not only from the bark symptoms but from any indications of mosaic symptoms in their leaves.

Treatment — Experiments have been carried on over a period of 10 of treatment for the control of psorosis. It has been found that this method, in most cases, offers an extremely simple and effective way to combat this disease if properly used during the early stages. When the disease has progressed so that it involves from half to two-thirds the circumference of trunks or large limbs it may still be advantageous to treat, provided the top has not begun to decline, but the chances of curing the trouble are greatly reduced. In some instances the disease may be eliminated by sacrificing individual limbs on which it has developed, when this can be done without harm to the tree. In more advanced cases of the disease, especially when the disease has broken out on the bark at several places and apparently has become systemic, there is little likelihood that the bark-scraping method of treatment will accomplish more than possibly prolonging life of the trees.

In the late stages of the disease, by the time the interior wood of the trunks and main limbs becomes extensively stained and discolored from invasion by various fungi, and the top has begun to decline, treatment appears to be absolutely ineffective and useless. When this point is reached in the development of psorosis the attacked trees appear to be doomed to die and may as well be removed when they cease to bear profitable crops of fruit, and replaced with new ones. There is no evidence to indicate that a healthy tree planted in the place where a tree has been removed on account of psorosis is any more likely to develop this disease than if planted elsewhere. The writer's experience with the results secured from the bark-scraping method of treatment for the control of psorosis in Florida agrees exactly with those secured with it in California, where tests have been carried out over an even greater period of time and on a much larger scale.

During the past year or so it has become a popular pastime in Florida for people to solicit business among citrus growers to effect magical cures for gummosis, psorosis and other diseases by boring holes into the bases of trees and stuffing them with secret mixtures of chemicals. It has been the experience of the writer that growers pay to have many trees treated for gummosis and psorosis when the trees in question merely suffer from bronzing, frenching, poor bud unions, various injuries to the years in Florida to determine the value of the bark-scraping method trunks, or general unthriftiness. So far as psorosis is concerned, he has yet seen no worth-while response from the treatment, and is convinced that Barnum was quite correct in theory but entirely too conservative in his mathematics.

TABLE 1.—Tabulation of orange trees exhibiting psorosis, classified according to degree of severity, in 1927 and 1936 respectively.

Classification of disease in 1927	Classification of diesease in 1936								
	No. of trees showing disease	Removed and replanted in 1928	Removed and replanted in 1932	Removed in 1936 but not replanted	Very Bad	Bad	Moderate	Slight	very slight	No evidence of psorosis
Very Bad	4	3	0	1	0	0	0	0	0	0
Bad	14	6	2	5	1	0	0	0	0	0
Moderate	19	0	4	4	2	4	5	0	0	0
Slight	15	0	0	2	1	1	4	0	2	5
Very Slight	4	0	0	0	0	0	0	0	0	4
No evidence of psorosis	250	0	1*	1**	0	2	5	4	3	245

* Cause Unknowns. **Root rot

Bill, while swimming at a bathing resort, met a friend who introduced him to his wife who was in bathing. A week later Bill found himself seated opposite his friend's wife on a trolley car. He bowed. She looked puzzled for a moment and then exclaimed: "Oh, how do you do? I didn't recognize you with your clothes on."

She left the car at the next corner.

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WHENCE AND WHITERS THE CITRUS INDUSTRY

(Continued from page 3)

citrus industry that had occurred for a half century. It was, of course, the crystallization of the slow progress that has been under way for many years.

The first varieties of the important new groups of hybrid fruits now known as Tangelos and Citranges were originated and named as a result of this work. The possibility of controlling the white fly and certain scale insects by the use of parasitic fungi which were discovered and described was first called to attention.

A New Spray Demonstrated

No more spectacular scene ever occurred in the meetings of this Society than took place at the 1894 meeting in Jacksonville when Dr. Swingle reported his discovery of making a sulphur solution by mixing flowers of sulphur with a small amount of water and then stirring in a certain quantity of powdered Caustic Soda (Report 1894 p. 71). If any are here who were in attendance at that time they will remember the thrill that went through the audience when leaning forward or standing in their seats they were startled to see the puff of the chemical reaction taking place before their eyes resulting in a second in liquifying the whole mass.

I might also tell of my own demonstration at the same meeting in mixing a new rosin wash. The demonstration was eminently successful in its own effect. There were deafening shouts when I came to shake the long glass cylinder to mix the ingredients. In those days deluded economic people used celluloid collars and cuffs which were not bad when one wanted to look fresh and clean in sweaty Florida days. Well when I started to shake the tube the rattle of the cuff buttons in my celluloid cuffs startled the people on the streets a block away. Soon you couldn't hear the cuffs for the shouts of laughter. I have never since worn a celluloid cuff and the industry, I believe, went broke. The rosin wash however was a success.

The Great Interlude

Californians never mention earthquakes, and I presume Floridans never mention the **Great Freeze**, except to date Johnny's birth by that catastrophy, thus let us call it the **Great Interlude.** This great interlude changed the face of the citrus industry and set Florida back 16 years, as it required that length of time to rebuild the groves and again reach the nearly six million box production expected in 1894-95, the year the freeze occurred. Sixteen long years of discouragement, what a heartrending period. The men from the subtropical laboratory were moved back to Washington. The people returned to hogs and hominy, but no calls for help went out. Belts were tightened and they got along somehow. It was the marvel of the century. Men seem to be made of different stuff in these modern days of F. R. G.'s and P. W. A.'s.

Enter Rolfe, Hume and Fawcett

Professor Rolfe, who had previously worked mainly on vegetables, left the State Experiment Station going to South Carolina but later returned to take charge of the government subtropical laboratory, which had been moved to Miami, and to begin work on citrus diseases. Professor Hume was called to the State Experiment Station and took up work mainly on citrus varieties and the State Experiment Station began to function actively in the investigation of citrus problem. It was also during this period that our own beloved Californian, Dr. H. S. Fawcett, then a young student in Iowa, was called to the University of Florida and took up the study of citrus diseases which finally was to place him in the forefront of all workers of the world in that field. Florida has developed many leaders. I shall not review the very noteworthy contributions of these three men further as they are well known to most of you.

Industry Disrupted by Cottony Cushion Scale

Just at the period following your forced interlude in Florida, when California should have been progressing rapidly, the industry in that state was threatened with extinction through a pest known as the cottony cushion scale, which had come in from Australia and spread through California groves like a prairie fire. The use of all known methods of control were but partially effective. Then in 1889 Albert Koebele was sent to Australia by the government to investigate the pest, and soon he forwarded back to his associate, Coquillette in California the now famous lady-bird beetle, the Vedalia, a predatory parasite of the scale. This was bred and distributed in the groves with the wonderful result that soon the much feared cottony cushion scale disappeared, and a promising new method of pest control introduced.

Fumigation Introduced

It may also be pointed out that it

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at about this period that the use of fumigation with hyrocyanic acid gas was first introduced into the groves of California by D. W. Coquillette of the U. S. Department of Agriculture. This method as of course all know became the most effective and most generally used method of scale control.

Packing House Machinery Improved

In no part of the industry has improvement been more marked than in the perfection of mechanical devices used in packing houses. I could almost draw a floor plan of the arrangement of machinery of an ideal packing house of the 1893 period such as was used by our beloved member W. S. Hart, whose packing house at that time I thought to be a model of perfection. Now infinitely superior as they are, however, with their power driven mechanical weighers, washers, dryers, counters, sizers, coonveyors, box nailers, etc. We who grow and work producing fruit scarcely realize the advance that has been made in the mechanization of packing house processes, and that the great preponderance of this advance was achieved by Messrs. Parker and Stebler, manufacturers of Citrus packing house machinery of Riverside, California.

Bud Selection Introduced

Perhaps the next great advance affecting the industry was that achieved by the investigations of A. D. Shamel and his associates of the U. S. Department of Agriculture started at Riverside, California in 1909. These resulted in establishing the methods and principles of bud selection which are now being applied more or less generally in most citrus countries, and have had a great influence in unifying and increasing the tree production of our groves.

Some investigators, assuming that this program was based on the supposed continuous improvement made by selecting generation after generation from high yielding trees, have challenged the correctness of the method. This interpretation is erroneous. We all know that bud variations in citrus are very common and that most of such variations produce worthless fruit. The main factor achieved by bud selection is the greater certainty that the trees produced from good selected mother types will be more uniformly of the standard good type and productive. That bud variations toward both high and low yields occasionally occur is also doubtless true, and if buds are uniformly taken only from high yielding trees producing the best type of fruit, that show no tendency toward instability, we are pretty sure to get inherently good yielding trees and not likely to get low yielders. The policy in my judgement is fundamentally sound.

(To be concluded next month)

Most people can tell a doctor or a lawyer how to practice, a banker how to bank, a preacher how to preach and all people can tell and editor how to edit.

The neighbor who calls you "Brother" is not always brotherly.

C. D. Kime

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HORTICULTURAL SOCIETY'S GOLDEN JUBILEE

(Continued from Page 5)

sed group of players and two talented readers made the affair a most inspiring spectacle.

Fully 6000 persons, including visitors and citizens of Ocala, witnessed the pageant and in the setting of balmy skies, whispering pines and nature's own carpet the story of the introduction of citrus into Florida and its subsequent trials, troubles and successes was told to a highly appreciative audience. Even the moon played its share in shedding its golden glow over the story of the growth of Florida's Golden Harvest.

The election of officers at the final meeting resulted in the selection of men who at this session and at many previous ones have evidenced their deep interest in the welfare of the Society. The result follows:

C. W. Lyons, who served as acting president following the death of John S. Taylor, was elected president. Mr. Lyons has long been actively interested in the welfare of Florida's citrus industry and he is also president of the Florida Agricultural Research Institute of this state.

The other officers elected were: Bayard F. Floyd of Davenport, re-elected secretary for the 21st consecutive time; C. I. Brooks of Miami, Ralph Robinson of Orlando, and H. C. Hendricks of Eustis, were elected vice presidents; while N. A. Reasoner of Oneco, was elected treasurer.

F. M. O'Byrne, Lake Wales, W. F. Ward, Brooksville, and Frank L. Holland, Winter Haven, were elected as members of the executive committee. The program follows:

Tuesday Night, April 13, 8:00 P. M.

Music

Call to Order—Vice President C. W. Lyons, Tampa

Invocation—Rev. H. J. Wheeler, Ocala.

Address of Welcome—Mayor Bradford C. Webb, Ocala

Response to Address of Welcome —Dr. David Fairchild, Coconut Grove

Introduction of Older Members—H. Harold Hume, Gainesville

President's Annual Address

Address—Hon. Nathan Mayo, Tallahassee

Address—"Our Horticultural Heritage" Dr. H. J. Webber, Riverside, Cal.

Address "Society Reminiscences" H. H. Hastings, Atlanta, Ga.

Memorial Service.

Wednesday, April 14, 9:30 A. M.

Address—"Soil Fertility & Fertilizer Experiments on Bronzing of Citrus" George M. Bahrt and A. E. Hughes, U. S. D. A., Orlando.

Address—"The Effect of Manganese on Citrus Leaves and Fruit" Wallace R. Roy and G. M. Bahrt, U. S. D. A., Orlando.

Address—"Soil Acidity in Relation to Citrus Growth and Production" E. L. Lord, Orlando.

Address—"Practical Spraying and Dusting of Citrus" Frank L. Holland, Winter Haven.

Address—"Windbreaks for Prevention of Damage to Citrus Trees" Prof. H. S. Newins, Gainesville.

Address—(By Title)— "Observations on Psorosis of Citrus Trees in Florida" Dr. A. S. Rhoads, Cocoa

Wednesday, April 14, 2:00 P. M.

Program Krome Memorial Institute

Dr. H. S. Wolfe

Vice President and Chairman

Address—"Plant Introduction Reminiscences" Dr. David Fairchild, Coconut Grove

Address — "Pruning Avocado Trees" H. P. Traub, T. Ralph Robinson and H. E. Stevens, Bureau of Plant Industry, U. S. D. A. Orlando.

Address—"Growth Substances in Relation to Plant Propagation" P. W. Zimmerman, Boyce Thompson Institute, Yonkers, N. Y.

Address—"The Star Apple in Dade County" Bodil Kosel Lowe, Homestead

Address—(By Title)—"Shade tree Planting in Southern Florida" Gaines R. Wilson, Miami

Address — (By Title) — "Fifty Years of Tropical Fruit Culture in Florida" Dr. H. S. Wolfe, Homestead

Address—"New Information on Dr. Henry Perrine and His Work" T. Ralph Robinson, Orlando

Wednesday, April 14, 8:00 P. M.

Pageant—"Golden Harvest" by Nina Oliver Dean, directed by J. J. Gerig, Ocala, at Silver Springs

Thursday, April 15, 9:30 A. M.

Address—"The Feeding of Citrus on Hammock Soils" R. S. Edsall, Wabasso

Address—"Soil Qualities of Practical Interest" Michael Peech, Lake Alfred

Address—"Spray Combinations for Use on Citrus Trees in Florida" W. W. Yothers, Orlando

Address—"The Control of Scale Insects on Citrus" Dr. R. L. Miller, Orlando

Address—"Early and Late Infestations of Rust Mites" W. L Thompson, Lake Alfred

Thursday, April 15, 2:00 P. M.

Address"The Tangerine Situation" W. H. Mouser, Orlando

Address—"A Canner's Viewpoint of the Grapefruit Situation" C. E. Lindsey, President Florida Grapefruit Canners Association, Lakeland

Address—"Regulating the Distribution of Florida Citrus" L. P. Kirkland, Auburndale

Address—"The Citrus Commission and Its Work of 1936-37" C. E. Stewart, DeLand

Address—"Citrus Legislation,, J. C. Morton, Waverly

Thursday, April 15, 8:00 P. M.

Address—"The Citrus Groves in Texas" (with Lantern Slides) Dr. A. F. Camp, Lake Alfred

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FLORIDA GRAPEFRUIT GROWERS SELL RECORD CROP THROUGH 3 OUTLETS

Sales of grapefruit by Florida growers from the beginning of the current season to the last week in December total 13,008 cars moved in commercial shipments, bought by canneries, and government purchases of surplus fruit for relief purposes according to figures compiled by the General Crops Section of the Agricultural Adjustment Administration.

Exclusive of fruit bought by the government, more than half of the movement of Florida's grapefruit has been to canneries since the canning season began during the first week in November. Continuance of this movement is expected to set an all-time record in the output of canned grapefruit products in Florida in any one season.

Based on the use of fruit by canners this season in comparison with other years, indications are that of the 17,500,000 boxes of grapefruit produced this year in Florida's bumper crop, about half will be put into cans. The previous high use of Florida grapefruit by canners was in 1934 when over one-third of the 15,200,000 boxes produced went into cans.

Carefully collected statistical data shows how Florida's biggest grapefruit crop in history is moving to market through three outlets instead of two as in former years. The new outlet was made available by the Agricultural Adjustment Administration and provides for purchases of surplus grapefruit for relief distribution throughout the country. Canned grapefruit juice buying by the government is to get under way soon as an additional means of stabalizing the price structure for fruit sold by growers. The government's purchase program supplements the effort which the Florida citrus industry is making in adjusting fresh fruit shipments to out-of-state market requirements under a marketing agreement developed by growers and shippers under the Agricultural Adjustment Act.

Look at the daily citrus market reports and then order the nourishment your trees need to help them bring into bearing a healthy crop of fine citrus fruit this coming season.

Sometimes it is the part of wisdom to appear foolish.

"It's pretty hard to beat

NATURE"

SULU
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Sulu, deep liver-and-white pointer bitch, owned by A. G. C. Sage, N. Y. *Handled by* Clyde Morton.

HERE is an action picture of the famous Sulu, the pointer who swept everything before her at National Field Trials of 1936 at Grand Junction, Tenn. Sulu, the queen of them all!

Thousands of bird dogs range the fields . . . but there's only one Sulu. To this glorious creature Nature gave her greatest gift, a perfect balance of the vital elements, speed, scent, endurance, instinct and intelligence. Another pointer may be just as good to look at, but Sulu has that vital spark—everything in perfect balance. So Sulu is the queen; the other is just a dog.

Just as Nature favored Sulu, she favored Natural Chilean Nitrate of Soda. Just as Sulu has everything in Nature's own balance, so has this nitrogen fertilizer. Nature aged and blended into Natural Chilean, more than thirty "impurities," or vital elements, that your crops need to grow and to produce their best.

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PRACTICAL SPRAYING AND DUSTING OF CITRUS

(Continued from page 14)

and more definite economic data seem to be needed.

Reasonable cost of this practical spray and dust program seems definitely warranted, and with a safe, dependable, efficient program now on hand there seems to be little reason for any grower not following some practical program at a profit to himself.

Note: I wish to acknowledge communications and assistance from Messrs. Marvin Walker, O. M. Felix, William A. Kuntz, H. E. Stevens, E. F. DeBusk, Paul Dowling, John Winston and R. H. F. Dade.

CLASSIFIED Advertisments

The rate for advertisements of this nature is only five cents per word for each insertion. You may count the number of words you have, multiply it by five, and you will have the cost of the advertisement for one insertion. Multiply this by the total number of insertions desired and you will have the total cost. This rate is so low that we cannot charge classified accounts, and would, therefore, appreciate a remittance with order. No advertisement accepted for less than 50 cents.

CROTALARIA—New crop, high quality, double cleaned, scarified Crotalaria Striata seed for sale. Attractive prices. Carolinas' Crotalaria Co., Camden, S. C.

FOR SALE—80 acres good citrus land, two miles northwest of Cocoa, Brevard County, Florida. Price $1600.00 cash. S. Hendry, City Point, Florida.

Our supply of Hamlins on Cleopatra root is running low. Advise orderding early. Zellwood Nurseries, Zellwood, Florida.

FILMS DEVELOPED 2 prints of each 25c; 20 reprints 25c. Pine Photo, Y-5134 Nevada, Chicago.

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WONDERFUL BARGAIN IN ORANGE GROVE PROPERTY

On account of advancing years, I find administering three large properties that I own takes more of my time than I need to give, as I have plenty. There are two, one with 600 Valencias and tangerines, mostly bearing. One with 5000 Valencias, Tahiti limes and tangerines, mostly in bearing. Splendid water, glorious health. On either of these properties you will never need an ounce of plant food. On first property there is room for 4000 more trees and allow pasture for work stock. On the second there is room for 25,000 more trees, 245 acres all told. Either of these properties can be divided into two or three parts to suit your pocketbook. A nominal down payment and the rest from returns from the property; 6 per cent interest.

More Americans have failed in Cuba than in any other citrus country anywhere — and the fault is their's, 100 per cent. Come here and work, let politics alone, forget rum, attend strictly to your own business and you will be a happy winner. Am a resident forty years. A climate of 10 to 15 degrees lower in summer than any part of Florida or the Mid-West of the U. S. I am not selling out, just offering surplus property. No cold, no storms, no fertilizer. Health to spare. You simply cannot lose. I also have a small property, 40 acres with 1200 Valencias, good water, rich soil, beginning to bear. $1000 will swing this. A bargain. Time on balance at 6 per cent.

Address Lock Box 1, Holguin, Cuba.

QUIT TOBACCO easily, inexpensively, without drugs. Send address. Ezra Stokes, Mohawk, Florida.

ALYCE CLOVER, the best legume for hay or covercrop. Write for information. Hardin Groves, Box 63, Lakeland, Fla.

CAUSERIENCE LEPIDOFLOIA—(So-called Brazilian oak), resembles Australian pine. Grand for wind-breaks. Cold resistant. Beautiful. Send for sample of foliage. $6.00 per 100. S. S. Matthews, Homestead, Fla.

UP to $20.00 paid for Indian Head Cents: Half Cents $125.00; Large Copper Cents $500.00, etc. Send dime for list. Romanocoinshop, D. Springfield, Mass.

FOR SALE—Small packing house machinery and equipment complete. Apply Hector Supply Company, Miami.

MEN WANTED—Sell shirts. No experience necessary. Free samples. Commission in advance. Free ties with shirts. Carroll Mills, 875A Flatbush Av., Brooklyn, N. Y.

LARGE Valencia, Hamlin, Perrine Lemon and grapefruit trees. Other varieties medium sized trees. Order now. Ward's Nursery, Avon Park, Fla.

FOR SALE: Several desirable bearing grapefruit and orange groves, in good condition, at extremely low prices. For information write H. C. Case, Box 87, Fort Myers, Fla.

"EVERY TRACTOR OWNER NEEDS IRVING'S 60 page 1937 tractor replacement parts catalog. Absolutely free. Thousands parts, all makes, tremendous price savings. Irving's Tractor Lug Co., 109 Knoxville Road, Galesburg, Illinois.

PATENTS

Send me sketch, picture, or model of your new invention. I will give you prompt report on its probable patentability based on a search of the patent records for a small charge.

PLANTS, BUSHES, TREES, VINES, ETC.
can now also be protected by Patents.
International Building
GEORGE E. COOK
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Registered Patent Attorney

CHOICE SOUR ORANGE SEEDLINGS for fall planting, very desirable stock. S. G. Coburn, Dade City, Florida.

HARDIN'S SPERRYOLA Lemon, a profitable adapted commercial variety for all sections. Hardy, prolific grower and producer. Limited number choice trees. Hardin Nurseries, Box 63, Lakeland, Fla.

WANTED—Man with from ten thousand to twenty thousand dollars to grow an entirely new orange for the U. S. markets. Cheap lands, no cold, plenty water, no fertilizer. A world beater in an orange. Patented.—Address, Buen Negocio, Gaveta-1, Holguin, Cuba.

PERSONAL—Quit Tobacco easily, inexpensively, without drugs. Send address. N. A. Stokes, Mohawk, Florida.

CITRUS NURSERY TREES, standard and new varieties on Cleopatra and Sour. Priced from 30c up. Grand Island Nurseries, Eustis, Fla.

FREE Booklet describes 87 plans for making $20-$100 weekly, home or office, busi-your own. Elite Service, 505 Fifth ave., New York City.

WANTED—To hear from owner having good farm for sale. Cash price, particulars. John Black, Chippewa Falls, Wisconsin.

PUREBRED PULLETS FOR SALE—White Leghorns and Anconas ready to ship. Barred Rocks and R. I. Reds shortly. Several hundred yearling White Leghorn hens now laying 70%. Write or wire for prices. C. A. Norman, Dr. 1440, Knoxville, Tenn.

LAREDO SOY BEANS, considered free from nematode, excellent for hay and soil improvement. Write the Baldwin County Seed Growers Association, Loxley, Alabama, for prices.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1883 by G. H. Gibbons, Waverly, Fla.

SEED—Rough lemon, sour orange, cleopatra. New crop from type true parent trees. Also thrifty seedlings. DeSoto Nurseries, DeSoto City, Florida.

NEW COMMERCIAL lemon for Florida, the Perrine; proven. All residents need yard trees, keeping Florida money at home. Booking orders for budded stock for Winter delivery. DeSoto Nurseries, DeSoto City, Fla.

CITRUS SEEDLINGS, all root stock varieties. $10.00 per 1000 up. Grand Island Nurseries, Eustis, Fla.

BUDDED trees new Florida commercial lemon, proven, thin skinned, juicy, scab immune. Also rough lemon, sour orange and Cleopatra seed and liningout seedlings. DeSoto Nurseries, DeSoto City, Fla.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineout size. De Soto Nurseries, DeSoto City, Fla.

CROTALARIA SPECTABILIS—Seed for sale. New crop, well cured, bright and clean. Price 25c per pound in 100 pound lots and over, 30c per pound in less quantities, f.o.b. Hastings, Bunnell, Lowell and San Antonio, Florida. F. M. LEONARD & COMPANY, Hastings, Florida.

WANTED—Position as packing house foreman; in citrus business twenty-five years; ten years' experience as foreman; married man. J. R. Henry, Okahumpka, Florida.

2 YEAR FIELD GROWN ROSES: Red, Pink, Shell, Salmon, White Radiance, Hollande, Columbia, Milady, Luxemburg, Edel, Padre, Victoria Talisman, Persian. All 19c each, postpaid, ship COD. Catalog free. NAUGHTON FARMS, Waxahachie, Texas.

CROTALARIA SPECTABILIS, fresh crop, scarified, $15.00 per 100 lbs. F. O. B. Eustis. GRAND ISLAND NURSERIES, EUSTIS, FLA.